No. 200300258

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS, SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN, FIELD (F1)

'PH81C'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of Washington, D.C. this tenth day of September, in the year two thousand and four.*

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproduction* — Form Approved - OMB No. 0581-005

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE
APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.
Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Pioneer Hi-Bred International, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME

3. VARIETY NAME
PH81C

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
7301 NW 62nd Avenue
Johnston, IA 50131-0085

5. TELEPHONE *(include area code)*
515/270-4051

6. FAX *(include area code)*
515/253-2125

FOR OFFICIAL USE ONLY

PVPO NUMBER
200300258

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OFORGANIZATION *(corporation, partnership, association, etc.)*
Corporation

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
IOWA

9. DATE OF INCORPORATION
March 5, 1999

FILING DATE
May 21, 2003

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

Steven R. Anderson
Research and Product Development
P.O. Box 85
Johnston, IA 50131-0085

FEES RECEIVED

FILING AND EXAMINATION FEES:
$ May 21, 2003
DATE $3652.00

CERTIFICATION FEE:
$ 432.00
DATE 8/27/04

11. TELEPHONE *(Include area code)*
515/270-4051

12. FAX *(Include area code)*
515/253-2125

13. E-MAIL
steven.anderson@pioneer.com

14. CROP KIND *(Common Name)*
CORN

15. GENUS AND SPECIES NAME OF CROP
Zea Mays

16. FAMILY NAME *(Botanical)*
Gramineae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☒ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)
- a. ☒ Exhibit A. Origin and Breeding History of the Variety
- b. ☒ Exhibit B. Statement of Distinctness
- c. ☒ Exhibit C. Objective Description of Variety
- d. ☐ Exhibit D. Additional Description of the Variety *(Optional)*
- e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
- g. ☒ Filing and Examination Fee ($3,652), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☐ YES *(If "yes", answer items 20 and 21 below)* ☒ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☐ YES ☐ NO
IF YES, WHICH CLASSES? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OROTHER COUNTRIES?
YES ☒ NO ☐

IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☒ YES ☐ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
		Steven R Anderson	
NAME *(Please print or type)*		NAME *(Please print or type)*	
		Steven R. Anderson	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
		Research Scientist	5/16/2003

ST-470 (02-10-2003) designed by the Plant Variety Protection Office using Word 2000. Replaces former versions of ST-470, which are obsolete. *(See reverse for instructions and information collection burden statement)*

2003 0 0258

INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $3,652 ($432 filing fee and $3,220 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

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21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

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22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

Nov. 1, 2002 Canada

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23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).) United States Patents 5,500,365; 5,352,605; 5,359,142; 5,322,938;5,164,316; 5.196,525; 5,424,200*

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed.htm

ST-470 (02-10-2003) designed by the Plant Variety Protection Office with Word 2000. Replaces former versions of STS-470, which are obsolete.

Exhibit A: Developmental history for parent PH4NM

PHFW4<5PHP38<4B73+gene for European corn borer resistance)24X

Pioneer Line PH4NM, *Zea mays L.*, a flint, corn, inbred, was developed by Pioneer Hi-Bred International, Inc. using the backcrossing method of plant breeding. Variety PHFW4 was used as the recurrent parent. The donor parent was derived from a B73 variety containing a gene for European corn borer resistance. Varieties PHFW4 (PVP Certificate No. 9600177), and PHP38 (PVP Certificate No. 9000250) are proprietary inbred lines of Pioneer Hi-Bred International, Inc. During backcrossing generations, plants were selected from populations for European Corn Borer resistance. In addition plants were selected for the recurrent parent plant type during all generations following the BC1F1 generation.

After 4 generations of backcrossing, the line was selfed for 3 generations. Trials were grown at Mankato, Minnesota as well as other Pioneer research locations. Generations of the line have been grown and hand-pollinated with observations made for uniformity.

Variety PH4NM has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". In addition to the backcrossing generations, it has been self-pollinated and ear-rowed 2 generations with careful attention paid to selection criteria and uniformity of plant type to assure genetic homozygousity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity and stability, and for 3 generations during the final stages of inbred development and seed multiplication. Very high standards for genetic purity have been established morphologically using field observations and electrophoretically using sound lab molecular marker methodology.

No variant traits have been observed or are expected in PH4NM.

The criteria used in the selection of PH4NM were European corn borer resistance, PHFW4 plant type, yield, both per se and in hybrid combinations; late season plant health, grain quality, stalk lodging resistance, and kernel size, especially important in production. Other selection criteria include: ability to germinate in adverse conditions; disease and insect resistance; pollen yield and tassel size.

PH4NM Breeding History

Season/Year Pedigree Grown	Inbreeding Level of Pedigree Grown
PHFW4 Winter 1994	F0
PHP38<4B73*gene for European Corn Borer resistance Winter 1994	F0
PHFW4<PHP38<4B73*Gene for European Corn Borer resistance) Spring 1995	F1
PHFW4<2PHP38<4B73*Gene for European Corn Borer resistance) Summer 1995	BC1F1
PHFW4<3PHP38<4B73*Gene for European Corn Borer resistance) Winter 1995	BC2F1
PHFW4<4PHP38<4B73*Gene for European Corn Borer resistance) Spring 1996	BC3F1
PHFW4<5PHP38<4B73*Gene for European Corn Borer resistance Summer 1996	BC4F1
PHFW4<5PHP38<4B73*Gene for European Corn Borer resistance)2 Winter 1996	BC4F2
PHFW4<5PHP38<4B73*Gene for European Corn Borer resistance)24 Summer 1997	BC4F3
PHFW4<5PHP38<4B73*Gene for European Corn Borer resistance)24X	BC4F4

** The donor parent was originally B73 with a gene for European Corn Borer resistance. The gene was delivered to the recurrent parent PHP38 via backcrossing. The PHP38 variety with the European Corn Borer resistance trait was then used as a donor parent in backcrossing to the recurrent parent PHFW4.

Exhibit A: Developmental history for parent PH4NF

Exhibit A. Origin and Breeding History

Pedigree:

PHK05<5PHJ90<4B73+gene for European corn borer resistance)38X

Pioneer Line PH4NF, *Zea mays L.*, a flint, corn, inbred, was developed by Pioneer Hi-Bred International, Inc. using the backcrossing method of plant breeding. Variety PHK05 was used as the recurrent parent. The donor parent was derived from B73 and contains a gene for European corn borer resistance. Varieties PHK05 (PVP Certificate No. 8800001), and PHJ90 (PVP Certificate No. 9100093) are proprietary inbred lines of Pioneer Hi-Bred International, Inc. During backcrossing generations, plants were selected from populations for European Corn Borer resistance. In addition plants were selected for the recurrent parent plant type during all generations following the BC1F1 generation.

After 4 doses of backcrossing, the line was selfed for 3 generations. Trials were grown at Mankato, Minnesota as well as other Pioneer research locations. Generations of the line have been grown and hand-pollinated with observations made for uniformity.

Variety PH4NF has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". In addition to backcrossing generations, it has been self-pollinated and ear-rowed 2 generations with careful attention paid to selection criteria and uniformity of plant type to assure genetic homozygousity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity and stability, and for 2 generations during the final stages of inbred development and seed multiplication. Very high standards for genetic purity have been established morphologically using field observations and electrophoretically using sound lab molecular marker methodology.

No variant traits have been observed or are expected in PH4NF.

The criteria used in the selection of PH4NF were European corn borer resistance, PHK05 plant type, yield, both per se and in hybrid combinations; late season plant health, grain quality, stalk lodging resistance, and kernel size, especially important in production. Other selection criteria include: ability to germinate in adverse conditions; disease and insect resistance; pollen yield and tassel size.

PH4NF Breeding History

Season/Year Pedigree Grown	Inbreeding Level of Pedigree Grown
PHK05 Winter 1994	F0
PHJ90<4B73*Gene for European Corn Borer Resistant Winter 1994	F0
PHK05<PHJ90<4B73*Gene for European Corn Borer Resistance) Spring 1995	F1
PHK05<2PHJ90<4B73*Gene for European Corn Borer Resistance) Summer 1995	BC1F1
PHK05<3PHJ90<4B73*Gene for European Corn Borer Resistance) Winter 1995	BC2F1
PHK05<4PHJ90<4B73*Gene for European Corn Borer Resistance) Spring 1996	BC3F1
PHK05<5PHJ90<4B73*Gene for European Corn Borer Resistance Summer 1996	BC4F1
PHK05<5PHJ90<4B73*Gene for European Corn Borer Resistance)3 Winter 1996	BC4F2
PHK05<5PHJ90<4B73*Gene for European Corn Borer Resistance)38 Summer 1997	BC4F3
PHK05<5PHJ90<4B73*Gene for European Corn Borer Resistance)38X	BC4F4

** The donor parent was originally B73 with a gene for European Corn Borer resistance. The gene was delivered to the recurrent parent PHJ90 via backcrossing. The PHJ90 with the European Corn Borer resistance was then used as a donor parent in backcrossing to the recurrent parent PHK05.

Pedigree: PH4NF/PH4NM

Pioneer Line PH81C, *Zea mays L.*, a flint, corn, F1, hybrid, was developed by Pioneer Hi-Bred International, Inc. from the inbreds PH4NF X PH4NM. Varieties PH4NF and PH4NM are proprietary inbred lines of Pioneer Hi-Bred International, Inc. These inbreds were derived by backcrossing using (PHK05) and (PHFW4) as the recurrent parents. The donor parents were used to incorporate European Corn Borer resistance into these lines. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Mankato, Minnesota, as well as other Pioneer research locations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown with observations again made for uniformity.

Variety PH81C has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". Being an F1 hybrid used as a female in hybrid production, the parent seed is required to reproduce the genotype. The parents and the F1 hybrid were developed with careful attention paid to selection criteria and uniformity of plant type to assure genetic and phenotypic stability. Very high standards for genetic purity have been established morphologically using field observations and electrophoretically using sound lab molecular marker methodology.

No variant traits have been observed or are expected in PH81C.

The criteria used in the selection of PH81C were yield as a female, both per se and in hybrid combinations; European Corn Borer resistance, late season plant health, grain quality, stalk lodging resistance, and kernel size, especially important in production. Other selection criteria include: ability to germinate in adverse conditions; disease and insect resistance.

Exhibit A: Developmental history for PH81C

Season/Year Pedigree Grown	Inbreeding Level of Pedigree Grown
Summer 1997 PH4NF	F0
Summer 1997 PH4NM	F0
Summer 1998 PH81C	F1

#Uniformity and stability were established when seed supplies were increased. Rogues were carefully removed if present. Uniformity and stability of the F1 were also controlled by careful development of the homozygous parents used to produce this F1 hybrid.

Exhibit B: Novelty Statement

Variety PH81C mostly resembles Pioneer Hi-Bred International, Inc. proprietary inbred line PHM5Z. Tables 1A and 1B show two sample t-tests on data collected primarily in Johnston and Dallas Center, IA. The traits collectively show measurable differences between the two varieties.

Variety PH81C has a greater ear diameter (37.1 mm vs 32.6 mm) than variety PHM5Z (Table 1A, 1B).

Variety PH81C has a greater kernel length (9.1 mm vs 7.7 mm) than variety PHM5Z (Table 1A, 1B).

Variety PH81C has shorter husk length (17.2 cm vs 20.1 cm) than variety PHM5Z (Table 1A, 1B).

JMS 6/2/04

Variety PH81C has a lower percent round kernels (40.2 % vs 81.2 %) than variety PHM5Z (Table 2A, 2B).

Variety PH81C has a light red cob color (Munsell 2.5YR 4/8) versus a white cob color (Munsell 5Y 9/1) for variety PHM5Z (Figures 1A, 1B).

Exhibit B: Novelty Statement Tables

Table 1A: Data from Johnston and Dallas Center, IA in 2002 broken out by environment are supporting evidence for differences between PH81C and PHM5Z. Varieties were grown in 3 locations that had different environmental conditions. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

TRAIT	STA	VARIETY-1	VARIETY-2	Count-1	Count-2	Mean-1	Mean-2	Mean_Diff	StdDeviation-1	StdDeviation-2	StdError-1	StdError-2	DF_Pooled	t-Value_Pooled	Prob_(2-tail)_Pooled
ear diameter (mm)	AD	PH81C	PHM5Z	5	5	38.2	35.2	3.0	1.643	1.095	0.735	0.490	8	3.4	0.009
ear diameter (mm)	DC	PH81C	PHM5Z	5	5	35.0	29.4	5.6	2.000	1.140	0.894	0.510	8	5.4	0.001
ear diameter (mm)	JH	PH81C	PHM5Z	5	5	38.2	33.2	5.0	1.483	1.924	0.663	0.860	8	4.6	0.002
husk length (cm)	AD	PH81C	PHM5Z	5	5	17.6	19.4	-1.8	1.342	1.673	0.600	0.748	8	-1.9	0.097
husk length (cm)	DC	PH81C	PHM5Z	5	5	16.0	20.0	-4.0	1.581	2.828	0.707	1.265	8	-2.8	0.025
husk length (cm)	JH	PH81C	PHM5Z	5	5	18.0	21.0	-3.0	0.707	0.707	0.316	0.316	8	-6.7	0.000
kernel length (mm)	AD	PH81C	PHM5Z	5	5	9.4	8.0	1.4	1.140	0.000	0.510	0.000	8	2.7	0.025
kernel length (mm)	DC	PH81C	PHM5Z	5	5	8.4	7.4	1.0	0.548	0.548	0.245	0.245	8	2.9	0.020
kernel length (mm)	JH	PH81C	PHM5Z	5	5	9.6	7.8	1.8	0.894	0.837	0.400	0.374	8	3.3	0.011

Exhibit B. Novelty Statement Tables

Table 1B: Summary data from Johnston and Dallas Center, IA in 2002 across environments are supporting evidence for differences between PH81C and PHM5Z. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

TRAIT	VARIETY-1	VARIETY-2	Count-1	Count-2	Mean-1	Mean-2	Mean Diff	StdDeviation-1	StdDeviation-2	StdError-1	StdError-2	DF_Pooled	t-Value_Pooled	Prob_(2-tail)_Pooled
ear diameter (mm)	PH81C	PHM5Z	15	15	37.1	32.6	4.5	2.232	2.823	0.576	0.729	28	4.9	0.000
kernel length (mm)	PH81C	PHM5Z	15	15	9.1	7.7	1.4	0.990	0.594	0.256	0.153	28	4.7	0.000
husk length (cm)	PH81C	PHM5Z	15	15	17.2	20.1	-2.9	1.474	1.922	0.380	0.496	28	-4.7	0.000

Exhibit B: Novelty Statement tables

Table 1A: Data from Johnston and Dallas Center, IA broken out by year and across environments are supporting evidence for differences between PH81C and PHM5Z. Each year varieties were grown in 3 locations that had different environmental conditions. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

DataField	YEAR	VARIETY-1	VARIETY-2	Count-1	Count-2	Mean-1	Mean-2	Mean-Diff	StdDeviation-1	StdDeviation-2	StdError-1	StdError-2	DF_Pooled	t-Value_Pooled	Prob_(2-tail)_Pooled
%Round Kernels (13x3/4)	2002	PH81C	PHM5Z	3	3	41.7	84.7	-43.0	11.372	8.083	6.566	4.667	4	-5.3	0.006
%Round Kernels (13x3/4)	2003	PH81C	PHM5Z	2	2	38.0	76.0	-38.0	2.828	1.414	2.000	1.000	2	-17.0	0.003

Table 1B: Summary data from Johnston and Dallas Center, IA across years and environments are supporting evidence for differences between PH81C and PHM5Z. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

DataField	VARIETY-1	VARIETY-2	Count-1	Count-2	Mean-1	Mean-2	Mean_Diff	StdDeviation-1	StdDeviation-2	StdError-1	StdError-2	DF_Pooled	t-Value_Pooled	Prob_(2-tail)_Pooled
%Round Kernels (13x3/4)	PH81C	PHM5Z	5	5	40.2	81.2	-41.0	8.408	7.463	3.760	3.338	8	-8.2	0.000

Exhibit B: Novelty Statement Figures

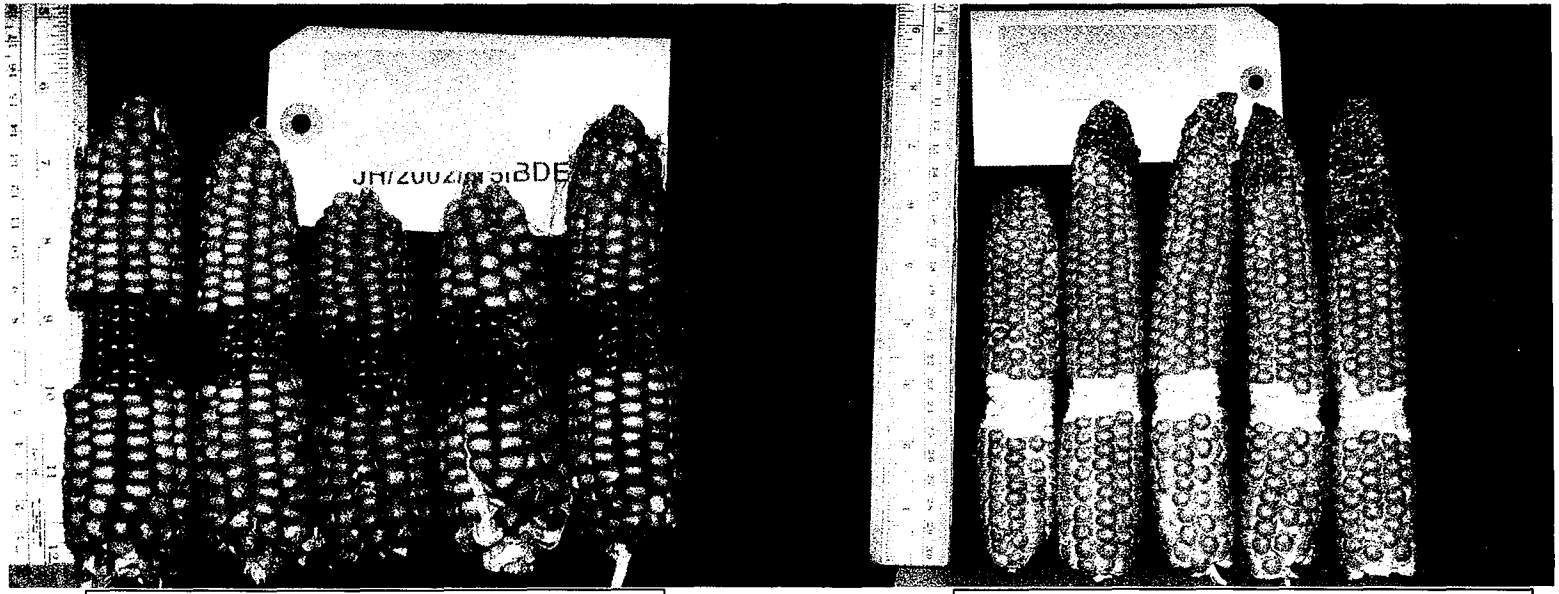

Figure 1A. PH81C

Figure 1B. PHM5Z

EXHIBIT C: (Corn; Maize) (8-22-2001)

United States Department of Agriculture, Agricultural Marketing Service
Science and Technology, Plant Variety Protection Office
National Agricultural Library Building, Room 400
Beltsville, MD 20705-2351

OBJECTIVE DESCRIPTION OF VARIETY
CORN (Zea mays L.)

Name of Applicant(s)	Variety Name or Temporary Designation:
Pioneer Hi-Bred International, Inc	**PH81C**

Address (Street & No., or R.F.D. No., City, State, Zip Code and Country)	**FOR OFFICIAL USE** PVPO Number
7301 NW 62nd Avenue, P.O. Box 85, Johnston, Iowa 50131-0085	**2003 0 0258**

Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by a "*" are considered necessary for an adequate variety description and must be completed.

COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices; describe #25 and # 26 in comments section)

01=Light Green	06=Pale Yellow	11=Pink	16=Pale Purple	21=Buff	26=Other (Describe)
02=Medium Green	07=Yellow	12=Light Red	17=Purple	22=Tan	
03=Dark Green	08=Yellow-Orange	13=Cherry Red	18=Colorless	23=Brown	
04=Very Dark Green	09=Salmon	14=Red	19=White	24=Bronze	
05=Green-Yellow	10=Pink-Orange	15=Red & White	20=White Capped	25=Variegated	

STANDARD INBRED CHOICES (Use the most similar (in back ground and maturity) of these to make comparisons based on grow-out trial data):

Yellow Dent Families:

Family	Members
B14	CM105, A632, B64, B68
B37	B37, B76, H84
B73	N192, A679, B73, NC268
C103	Mo17, Va102, Va35, A682
Ch43	A619, MS71, H99, Va26
WF9	W64A, A554, A654, Pa91

Yellow Dent (Unrelated):
Co109, ND246, Oh7, T232
W117, W153R
W182BN

White Dent
C166, H105, Ky228

Sweet Corn:
C13, Iowa 5125, P39, 2132

Popcorn
SG1533, 4722, HP301, HP7211

Pipecorn:
Mo15W, Mo16W, Mo24W

Application Variety Data	Standard Inbred Data
PH81C	**CM105**
1. TYPE: (describe intermediate types in comments sect.)	
3 (1=Sweet 2=Dent 3=Flint 4=Flour 5=Pop 6=Ornamental 7=Pipecorn)	3
Comments: Flint-Dent	Stand. Seed Source: AMES 19315
2. REGION WHERE DEVELOPED IN THE U.S.A.:	
2 (1=N.West 2=N.Central 3=N.East 4=S. East 5=S. Central, 6=S. West, 7=Other)	____Region

EXHIBIT C: (Corn; Maize) (8-22-2001)

Application Variety Data **PH81C** **CM105** Standard Inbred Data

3. MATURITY:					
Days	Heat Units		Days	Heat Units	
047	1,165.0	From emergence to 50% of plants in silk	49	1,227.7	
44	1,087.0	From emergence to 50% of plants in pollen	47	1,172.0	
2	67.7	From 10% to 90% pollen shed	3	74.0	
		From 50% silk to optimum edible quality			
		From 50% silk to harvest at 25% moisture			

4. PLANT:	St.Dev	S.Size	Avg.	St.Dev	S.Size
187.7 cm Plant Height (to tassel tip)	23.14	15	167.1	08.03	15
71.7 cm Ear Height (to base of top ear node)	13.04	15	61.6	06.06	15
13.9 cm Length of Top Ear Internode	1.94	15	12.2	1.61	15
0.0 Average Number of Tillers/plant	0.01	3	0.0	0.00	3
1.0 Average Number of Ears per Stalk	0.09	3	1.1	0.09	3
4 Anthocyanin of Brace Roots: 1=Absent 2=Faint, 3=Moderate, 4=Dark			3		

5. LEAF:	St.Dev	S.Size	Avg.	St.Dev	S.Size
8.1 cm Width of Ear Node Leaf	0.83	15	7.7	0.49	15
67.9 cm Length of Ear Node Leaf	4.56	15	79.9	4.87	15
6 Number of leaves above top ear	0.63	15	5	0.46	15
23 Degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf)	4.21	15	31	8.40	15
3 Leaf Color (Munsell code)*	5GY4/4		3		5GY4/4
4 Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)			3		

6. TASSEL:	St.Dev	S.Size	Avg	St.Dev	S.Size
10 Number of Primary Lateral Branches	2.37	15	6.3	3.20	15
49 Branch Angle from Central Spike	10.57	15	24.1	8.84	15
52.5 cm Tassel Length (from top leaf collar node to tassel tip)	4.58	15	45.6	3.66	15
6 Pollen Shed (0=male sterile to 9=heavy shed)			4		
7 Anther Color (Munsell code)*	5Y8.5/8		7/1		5Y9/4
17 Glume Color (Munsell code)*	10RP2/6		1		5GY6/6
2 Bar Glumes (Glume Bands): 1=Absent 2=Present			1		

Note: Use chart on first page to choose color codes for color traits

*Munsell Glossy Book of Color (a standard color reference) Kollmorgen Inst. Corp. New Windsor NY.

EXHIBIT C: (Corn; Maize) (8-22-2001)

Application Variety Data **PH81C**			**CM105** Standard Inbred Data		
7a. EAR (Unhusked Data):	St.Dev	S. Size	Avg.	St.Dev	S.Size
1 Silk Color * (3 days after emergence)	5GY8/8		1 2.5GY9/6		
1 Fresh Husk Color* (25 days after 50% silking)	2.5GY8/6		1 5GY6/6		
21 Dry Husk Color* (65 days after 50% silking)	10YR9/2		21 2.5Y8.5/4		
1 Position of Ear (1=Upright, 2=Horizontal, 3=Pendant)			3		
6 Husk Tightness (1=very loose to 9=very tight)			6		
2 Husk Extension: (at harvest): 1=Short (ears exposed), 2=Medium (<8cm), 3=Long (8-10cm beyond ear tip), 4=Very Long (>10cm).			2		
7b. EAR (Husked Ear Data):	St.Dev.	S.Size	Avg	St.Dev	S.Size
13.3 cm Ear Length	1.63	15	15.2	1.70	15
37.1 mm Ear Diameter at mid-point	2.23	15	38.9	2.33	15
83.7 gm Ear Weight	20.31	15	92.2	19.24	15
12 Number of Kernel Rows	0.83	15	13.5	1.19	15
2 Kernel Rows: 1=Indistinct 2=Distinct			2		
1 Row Alignment:1=Straight 2=Slightly Curved 3=Spiral			2		
8.3 cm Shank Length	2.28	15	11.5	2.77	15
2 Ear Taper: 1=Slight cylindrical, 2= Average slightly conical, 3=Extreme conical.			2		
8. KERNEL (Dried)	St.Dev.	S.Size	Avg.	St.Dev.	S.Size
9.1 mm Kernel Length	0.99	15	9.5	0.74	15
8.0 mm Kernel Width	0.65	15	7.2	0.68	15
5.1 mm Kernel Thickness	1.10	15	4.7	0.80	15
41.7 % Round Kernels (Shape Grade)	11.18	3	27.1	3.61	3
1 Aleurone Color Pattern: (1=Homozygous, 2=Segregating)			.1		
7 Aluerone Color (Munsell code)*	1.25Y7/14		1 9	2.5Y8/14	
7 Hard Endosperm Color (Munsell C)*	10YR7/10		7	2.5Y8/14	
3 Endosperm Type: 1=Sweet (Su1) 2=Extra Sweet (sh2) 3=Normal Starch, 4=High Amylose Starch, 5=Waxy Starch, 6=High Protein, 7=High Lysine, 8=Super Sweet (se), 9=High Oil, 10=Other_____			3		
25.0 gm Weight per 100 Kernels (Unsized sample)	1.73	3	20.3	0.58	3
9. COB:					
24.9 mm Cob Diameter at mid-point	1.68	15	26.2	1.37	15
14 Cob Color (Munsell code)*	2.5YR4/8		14	10R4/6	

10. DISEASE RESISTANCE:(1-most susceptable to 9-most resistant, Leave blank if not tested, Leave race or strain options blank if polygenic)	
A. LEAF BLIGHTS, WILTS, AND LOCAL INFECTION DISEASES	
__ Anthracnose Leaf Blight (Colletotrichum graminicola)	__
Common Rust (Puccinia sorghi)	
__ Common Smut (Ustilago maydis)	__
Eyespot (Kabatiella zeae)	
Gross's Wilt (Clavibacter michiganense spp. nebraskense)	
7 Gray Leaf Spot (Cercospora zeae-maydis)	4
__ Helminthosporium Leaf Spot (Bipolaris zeicola) Race:	__
5 Northern Leaf Blight (Exserohilum turcicum) Race:	4
Southern Leaf Blight (Bipolaris maydis) Race:	
5 Southern Rust (Puccinia polysora)	4
6 Stewart's Wilt (Erwinia stewartii)	7
__ Other (Specify):_____	__
B. SYSTEMIC DISEASES	
Corn Lethal Necrosis (MCMV and MDMV)	
Head Smut (Sphacelotheca reiliana)	
__ Maize Chlorotic Dwarf Virus (MDV)	__
__ Maize Chlorotic Mottle Virus (MCMV)	__
Maize Dwarf Mosaic Virus (MDMV)	
__ Sorghum Downy Mildew of Corn (Peronosclerospora sorghi)	__
__ Other (Specify):_____	__
C. STALK ROTS	
6 Anthracnose Stalk Rot (Colletotrichum graminicola)	6
__ Diploidia Stalk Rot (Stenocarpella maydis)	__
__ Fusarium Stalk Rot (Fusarium moniliforme)	__
__ Gibberella Stalk Rot (Gibberella zeae)	__
__ Other (Specify):_____	__
D. EAR AND KERNEL ROTS	
__ Aspergillus Ear and Kernel Rot (Aspergillus flavus)	__
Diplodia Ear Rot (Stenocarpella maydis)	
Fusarium Ear and Kernel Rot (Fusarium moniliforme)	
7 Gibberella Ear Rot (Gibberella zeae)	5
__ Other (Specify):_____	__
__	__

11. INSECT RESISTANCE: (1-most susceptable to 9-most resistant)	__
__ Banks Grass Mite (Oligonychus pratensis)	__
__ Corn Earworm (Helicoverpa zea)	__
__ Leaf Feeding	__
__ Silk Feeding ___.__mg larval wt.	__
__ Ear Damage	__
__ Corn Leaf Aphid (Rhopalosiphum maidis)	__
__ Corn Sap Beetle (Capophilus dimidiatus)	__
__ European Corn Borer (Ostrinia nubilalis)	__
1st. Generation (Typically whorl leaf feeding)	
2nd. Generation (Typically leaf sheath-collar feeding)	
__ Stalk Tunneling ___.__cm tunneled/plant	__
__ Fall Armyworm (Spodoptera frugiperda)	__
__ Leaf Feeding	__
__ Silk Feeding: ___,__ mg larval wt.	__
__ Maize Weevil (Sitophilus zea maize)	__
__ Northern Rootworm (Diabrotica barberi)	__
__ Southern Rootworm (Diabrotica undecimpunctata)	__
__ Southwestern Corn Borer (Diatreaea grandiosella)	__
__ Leaf Feeding	__
__ Stalk Tunneling ___.__cm tunneled/plant	__
__ Two-spotted Spider Mite (Tetranychus utricae)	__
__ Western Rootworm (Diabrotica virgifera virgifera)	__
__ Other (Specity)_____	__
12. AGRONOMIC TRAITS:	__
Staygreen (at 65 days after anthesis; rate from 1-worst to	
__ excellent)	__
0 % Dropped Ears (at 65 days after anthesis)	0
__ % Pre-anthesis Brittle Snapping	__
% Pre-anthesis Root Lodging	
% Post-anthesis Root Lodging (at 65 days after anthesis)	
% Post-anthesis Stalk Lodging	
3,174.0 Kg/ha Yield of inbred per se (at 12-13% grain moisture)	2,779.0
13 MOLECULAR MARKERS: (0-data unavailable; 1-data available but	__
not supplied; 2-data supplied)	
Isozymes 1 RFLP's RAPD's	

COMMENTS: (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in exhibit D)

CLARIFICATION OF DATA IN EXHIBITS B AND C

2003 0 0258

Please note the data presented in Exhibit B and C, "Objective Description of Variety," are collected primarily at Johnston and Dallas Center, Iowa. The data in Tables 1A and 1B are from two sample t-tests using data collected in Johnston and Dallas Center, IA. These traits in exhibit B collectively show distinct differences between the two varieties.

JMS 6/2/04

There are environmental factors that may differ from environment to environment that might explain larger standard deviations. Environmental temperature and precipitation differences during the vegetative and grain fill periods can impact plant and grain traits and be a source of variability. Please see table 3 summary of rainfall and growing season temperatures for 2002.

Table 3. Temperature and rainfall

TEMPERATURE

YEAR	MAY	JUN	JULY	AUG	AVERAGE
1994	59.8	70.7	71.9	69.0	**67.9**
1995	56.2	69.4	74.3	76.9	**69.2**
1996	56.2	69.3	71.3	70.5	**66.8**
1997	53.5	70.6	74.1	69.6	**67.0**
1998	64.7	66.6	74.8	73.5	**69.9**
1999	60.7	69.7	78.7	70.5	**69.9**
2000	63.5	68.9	73.2	74.2	**70.0**
2001	61.3	69.0	76.7	74.2	**70.3**
2002	57.7	73.5	77.9	71.7	**70.2**

RAINFALL

YEAR	MAY	JUN	JULY	AUG	Total
1994	3.67	5.75	1.71	4.18	**15.31**
1995	5.04	4.19	2.94	2.87	**15.04**
1996	8.47	4.35	2.51	2.14	**17.47**
1997	4.32	3.27	4.10	1.36	**13.05**
1998	6.46	11.07	5.70	4.96	**28.19**
1999	6.46	4.54	4.45	6.55	**21.85**
2000	5.40	5.80	3.16	1.78	**16.14**
2001	5.72	3.87	2.05	1.92	**13.56**
2002	2.91	2.78	5.34	4.00	**15.03**

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)

PIONEER HI-BRED INTERNATIONAL, INC.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER

3. VARIETY NAME

PH81C

4 ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*

7301 NW 62nd AVENUE
P.O.BOX 85
JOHNSTON, IA 50131-0085

5. TELEPHONE *(include area code)*

515-270-4051

6. FAX *(include area code)*

515-253-2125

7. PVPO NUMBER

200300258

8. Does the applicant own all rights to the variety? *Mark an "X" in the appropriate block.* **If no, please explain:** ☒ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country** ☒ YES ☐ NO

10. Is the applicant the original owner? ☒ YES ☐ NO **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☐ YES ☐ NO **if no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☒ YES ☐ NO **If no, give name of country**

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

Pioneer Hi-Bred International, Inc. (PHI), Des Moines, Iowa, and/or its wholly owned subsidiary Pioneer Overseas Corporation (POC), Des Moines, Iowa, is the employer of the plant breeders involved in the selection and development of PH81C. Pioneer Hi-Bred International and/or Pioneer Overseas Corporation has the sole rights and ownership of PH81C pursuant to written contracts that assign all rights in the variety to PHI and/or POC at the time such variety was created. No rights to this variety are retained by any individuals.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.